REMARKS

By this amendment, claims 1-20, 26-32, 34-38 and 89-128 are pending in the application. Of these, claims 1, 16, 19 and 26-31 are being amended and claims 89-128 are being added. Claims 21-25, 33 and 39-88 are being canceled. The claim amendments and new claims are supported by the specification and original claims, and no new matter is being added. Thus, entry of the amendments and reconsideration of the present case is requested.

Restriction Requirement

In response to the restriction requirement, Applicant elects the claims of Group I, drawn to a window with a mask, as defined by the Examiner, namely claims 1-20 and 26-38. Claims 21-25 and 39-88 are being canceled, without prejudice, as drawn to a non-elected invention.

Rejection Under 35 U.S.C. 112, Second Paragraph, of Claim 16

The Examiner rejected claim 16 under 35 U.S.C. 112, second paragraph, as "being indefinite." This rejection is traversed.

Claim 16 has been amended to depend from claim 12, and to recite "wherein the means for reducing deposition of process residue on the radiation transmitting portion comprises an overlying mask comprising an aperture having an aspect ratio of from about 0.25:1 to about 3:1." Thus, claim 16 is properly dependent from claim 12, which recites "means extending into the interior of the chamber," and claim 16 is not indefinite under 35 U.S.C. 112, second paragraph.

Rejection Under 35 U.S.C. 102 of Claims 1-2,4,8-9,12-14, 19-20, 26-27, 29, 32-33 and 35-36

The Examiner rejected claims 1-2, 4, 8-9, 12-14, 19-20, 26-27, 29, 32-33, and 35-36 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,074,985 to Tamura et al. This rejection is traversed.

Claim 1 is not anticipated by Tamura et al because Tamura et al fails to teach a "mask having an aperture comprising an aspect ratio that is selected to reduce deposition of process residue on the radiation transmitting portion," (emphasis added) as recited in the claim. Instead, Tamura et al teaches a shielding member having metal plates in which "the extremity portion of the metal plates 3a is made narrower in a conical shape in order to shield the window material surface against film forming particles" (column 5, lines 55-58.) In other words, Tamura et al teaches a shielding member having plates that are bent at an angle to protect underlying window material from particles that are incident from above. This is further demonstrated in Figure 2, which shows the tips of the metal plates bent over the window material to block the path of particles directed towards the window. However, blocking the path of particles is not the same as providing an aperture having an aspect ratio that is selected to reduce deposition, as in the claim. For example, as described on pages 16 through 17 of the present specification, the aspect ratio of the apertures may be selected to be sufficiently high to reduce access of gas particles to the radiation transmitting portion, or may be selected to be sufficiently low to preferentially select energetic plasma species to sputter etch away deposited process residue on the radiation transmitting portion. Tamura et al fails to teach selecting such aspect ratios, and instead teaches reducing deposition by providing bent shielding plates to block access to a window material. Thus, Tamura et al fails to teach the apertures having the selected aspects ratios to reduce deposition, and claim 1 and the claims depending therefrom are not anticipated by Tamura et al.

Claim 12 is not anticipated by Tamura et al because Tamura et al fails to teach "a radiation transmitting portion that allows radiation to be transmitted therethrough to monitor processing of the substrate," (emphasis added) as recited in the claim. Instead, Tamura et al teaches window material through which microwaves may be transmitted,(column 5, lines 16-26) but fails to teach that the window material allows monitoring of processing of the substrate. Furthermore, Tamura et al teaches a shielding member having metal plates that are bent to block access towards the window material, and thus would also block radiation incident on the window material from a substrate. In other words, Tamura et al teaches against the radiation transmitting portion that allows monitoring of the substrate by teaching a shielding member that blocks access to the window material, and would thus block radiation that would allow monitoring of the substrate process. Thus Tamura et al fails to teach each and every aspect of the claim, and claim 12 and the claims depending therefrom are not anticipated by Tamura et al.

Claim 19 recites "a mask with a plurality of apertures, the apertures having an aspect ratio that is selected to reduce deposition of process residues on the radiation transmitting portion" (emphasis added.) Thus, claim 19 and the claims depending therefrom are not anticipated by Tamura et al because, as discussed above, Tamura et al teaches blocking a flow direction of particles towards a window material by providing bent plates, but does not teach providing an aspect ratio that is selected to reduce deposition on a radiation transmitting portion.

Similarly, claim 26 recites a "mask comprising a plurality of apertures having an aspect ratio that is selected to reduce deposition of process residues on the radiation transmitting portion" (emphasis added.) As Tamura et al fails to teach the aspect ratio recited in the claim, claim 26 and the claims depending therefrom are not anticipated by Tamura et al.

The Examiner rejected claims 1-2, 4, 8-9, 12-14, 19-20, 26-27, 29, 32-33, and 35-36 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,006,694 to DeOrnellas et al. This rejection is traversed.

Claim 1 is not anticipated by DeOrnellas et al because DeOrnellas fails to teach a "mask having an aperture comprising an aspect ratio that is selected to reduce deposition of process residue on the radiation transmitting portion," (emphasis added) as recited in the claim. Instead, DeOrnellas et al teaches a shield that reduces deposition on a window, because the shield "interrupts a line-of-sight sputter path between a material sputtered from the wafer 26, and the window 38" (column 4, lines 16-18.) Thus, DeOrnellas et al teaches reducing deposition by providing a shield that blocks or interrupts the path of particles directed towards the window, but fails to teach apertures having an aspect ratio that is selected to reduce deposition. As discussed above, blocking the path of particles directed towards the window is not the same as selecting an aspect ratio to reduce deposition. Thus, as DeOrnellas et al fails to teach the aperture comprising the aspect ratio recited in the claim, and claim 1 and the claims depending therefrom are not anticipated by DeOrnellas et al.

Claim 12 is not anticipated by Deornellas et al because DeOrnellas et al fails to teach "a radiation transmitting portion that allows radiation to be transmitted therethrough to monitor processing of the substrate," as recited in the claim. Instead, DeOrnellas et al teaches "a power transfer window ... which allows the power that is transferred through the inductive coil of upper electrode 32 to be coupled to the reactor chamber 23" (column 3, lines 66-67 to column 4, lines 1-2.) Thus, DeOrnellas teaches a window that allows inductive power to be coupled therethrough, but does not teach a window that allows radiation through to monitor processing of a substrate. Furthermore, DeOrnellas et al teaches against the claimed invention by teaching a shield that interrupts a line-of-site path between a wafer and the window, as discussed above. In other words, DeOrnellas teaches an apparatus in which the path from the wafer to the window is obstructed, and thus

monitoring of the substrate through the window would be similarly obstructed. Accordingly, as DeOrnellas et al fails to teach each and every aspect of the claim, claim 12 and the claims depending therefrom are not anticipated by De Ornellas et al.

Claim 19 recites "a mask with a plurality of apertures, the apertures having an aspect ratio that is selected to reduce deposition of process residues on the radiation transmitting portion," (emphasis added) and thus is also not anticipated by DeOrnellas et al. As discussed above, DeOrnellas et al teaches a shield that blocks a line-of-sight path to a window, but does not teach apertures having an aspect ratio that is selected to reduce deposition on a radiation transmitting portion. Accordingly, claim 19 and the claims depending thereform are not anticipated by DeOrnellas et al.

Similarly, claim 26 recites a "mask comprising a plurality of apertures having an aspect ratio that is selected to reduce deposition of process residues on the radiation transmitting portion," (emphasis added), and thus claim 26 and the claims depending therefrom are not anticipated by DeOrnellas et al because DeOrnellas et al fails to teach the apertures comprising the aspect ratio selected to reduce depositon

The Examiner rejected claims 26-27, 29, 32 and 36 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 3,170,383 to Hunt. This rejection is traversed.

Claim 26 is not anticipated by Hunt because Hunt fails to teach a "mask comprising a plurality of apertures," (emphasis added) as recited in the claim. Instead, Hunt teaches "an elongated viewing tube 21" (column 3, lines 13-14) and a "window 23, disposed outwardly of the viewing tube" (column 3, line 20). Thus, Hunt teaches an elongated viewing tube comprising a single aperture, but does not teach a plurality of apertures. As Hunt fails to teach each and every aspect of the claim, claim 26 and the claims depending therefrom are not anticipated by Hunt.

The Examiner rejected claims 26-27, 29, 32 and 36 under 35 U.S.C. 102(b) as being anticipated by J.P. Patent No. 62-042514 to Kondo. This rejection is traversed.

Claim 26 is not anticipated by Kondo because Kondo fails to teach "mask comprising a plurality of apertures," (emphasis added) as recited in the claim. Instead, Kondo teaches that "shielding plate 15 is ... provided with a hole 15a ... positioned on the focal point of a lens 12" (Constitution section.) Thus, Kondo teaches providing a single hole or aperture in a shielding plate, but fails to teach providing a mask comprising a plurality of apertures. Accordingly, as Kondo fails to teach each and every aspect of the claim, claim 26 and the claims depending therefrom are not anticipated by Kondo.

The Examiner rejected claims 26-27, 29, 32 and 35-36 under 35 U.S.C. 102(b) as being anticipated by J.P. Patent No. 9-126991 to Oshida et al. This rejection is traversed.

Claim 26 is not anticipated by Oshida et al because Oshida et al fails to teach an "overlying mask comprising a plurality of apertures having an aspect ratio that is selected to reduce deposition of process residues on the radiation transmitting portion," (emphasis added) as recited in the claim. Instead, Oshida et al teaches a perforated opaque filter comprising holes that filters material away from optical systems, where "the ratio of diameter D to hole pitch P is selected to be as large as possible" (paragraph 26.) As can be seen from Figure 4, this ratio is not the aspect ratio of the hole, which is the ratio of the length of the hole to the width or diameter of the hole, but is instead the ratio of the hole diameter to the sum of the hole diameter plus the spacing between holes. Thus, Oshida et al fails to teach the selected aspect ratio of the claim. Furthermore, this teaching of Oshida et al teaches against the selected aspect ratio by indicating the desirability of optimizing the diameter of the holes independently and without regard to the length of the holes. In contrast, the present invention selects the length of the aperture with respect to the width of the aperture, to provide an aspect ratio that reduces deposition. Oshida et al also teaches

against the selected aspect ratio by teaching that "the relationship between hole pitch P and filter thickness t is optimized corresponding to the directionality of illuminating optical system" (paragraph 26.) In other words, Oshida et al teaches that the thickness, or length, of the holes is selected with respect to the illuminating direction, for example to ensure adequate light transmission through the holes, but is not selected in concert with the width of the holes to reduce deposition. Thus, Oshida et al teaches against the aspect ratio selected to reduce deposition by teaching the desirability of selecting the hole diameter and thickness independently of one another. Oshida et al fails to teach each and every aspect of the claim, and claim 26 and the claims depending therefrom are not anticipated by Oshida et al.

Rejection Under 35 U.S.C. 103 of Claims 3, 5-7, 15-16, 28, 30-31 and 34.

The Examiner rejected claims 3, 5-7, 15-16, 28, 30-31 and 34 under 35 U.S.C. 103(a) as being unpatentable over Tamura et al. This rejection is traversed.

Claim 1, from which claims 3 and 5-7 depend, is patentable over Tamura et al because, as discussed above, Tamura et al fails to teach or suggest a "mask having an aperture comprising an aspect ratio that is selected to reduce deposition of process residue on the radiation transmitting portion," (emphasis added) as recited in the claim. Instead, Tamura et al teaches a shielding member having metal plates in which "the extremity portion of the metal plates 3a is made narrower in a conical shape in order to shield the window material surface against film forming particles" (column 5, lines 55-58.) In other words, Tamura et al teaches a shielding member having plates that are bent at an angle to protect underlying window material from particles that are incident from above (see also Figure 2.) Thus, Tamura et al teaches against the claimed invention by teaching that it is necessary to provide metal plates that block a path of particles directed towards the window material. Based on this teaching, one of ordinary skill in the art would not have found it obvious to reduce deposition simply by providing apertures which do not block a path of

particles incident on the radiation transmitting portion, but which reduce deposition by virtue of the selection of the aspect ratio. For example, one of ordinary skill in the art would have been taught away from simply selecting an aspect ratio that is high enough such that access of gas to the radiation transmitting portion is limited, or that is low enough to preferentially allow energetic species to reach the radiation transmitting portion to etch away residue deposited on the radiation transmitting portion. Thus, as Tamura et al teaches away from reducing deposition on a radiation transmitting portion by providing apertures having a selected aspect ratio, Claim 1 and the claims depending therefrom are patentable over Tamura et al.

Claim 12, from which claims 15-16 depend, is patentable over Tamura et al because Tamura et al fails to teach or suggest "a radiation transmitting portion that allows radiation to be transmitted therethrough to monitor processing of the substrate," (emphasis added) as recited in the claim. Instead, as discussed above, Tamura et al teaches a window material through which microwaves may be transmitted, but does not teach that the window material allows monitoring of processing. Tamura et al further teaches away from the claimed invention by teaching shielding plates that block a path of particles directed towards the window material, and thus would also block any radiation that could be used to monitor processing from the window material. Thus, based on Tamura et al's teachings of blocking the window material, it would not have been obvious to one of ordinary skill in the art to provide a radiation transmitting portion that allows radiation to be transmitted therethrough to monitor processing of a substrate. Accordingly, claim 12 and the claims depending thereform are patentable over Tamura et al.

Claim 26, from which claims 28, 30-31 and 34 depend, is patentable over Tamura et al because Tamura et al fails to teach or suggest a "mask comprising a plurality of apertures having an aspect ratio that is selected to reduce deposition of process residues on the radiation transmitting portion," (emphasis added) as recited in the claim. Instead, as discussed for claim 1 above, Tamura et al teaches reducing deposition by blocking a path of

particles incident on a window material. Thus, one of ordinary skill in the art would not have found it obvious to reduce deposition simply by providing apertures having a selected aspect ratio, and claim 26 and the claims depending therefrom are patentable over Tamura et al.

Objected to Claims10-11, 17-18 and 37-38

The Examiner objected to claims 10-11, 17-18 and 37-38 as being "dependent upon a rejected base claim," but indicated that they would be allowable if re-written in independent form and including all of the limitations of their base and any intervening claims.

Claims 10, 11, 17, 18, 37 and 38 have been re-written in independent form as claims 89, 96, 103, 108, 113 and 121, respectively, and thus these claims and the claims depending therefrom are believed to be allowable.

CONCLUSION

The above-discussed amendments and remarks are believed to place the present application in condition for allowance. Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,

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MARKED-UP CLAIMS FOR S/N: 09/610,237

1. (twice amended) A substrate processing chamber comprising:

(a) a support;

(b) a gas distributor;

(c) a gas energizer;

(d) a wall comprising a radiation transmitting portion;

(e) a mask overlying the radiation transmitting portion, the mask having an aperture comprising an aspect ratio that is selected to reduce deposition of process residue on the radiation transmitting portion; and

(f) an exhaust,

whereby a substrate held on the support may be processed by process gas distributed by the gas distributor, energized by the gas energizer, and exhausted by the exhaust, and whereby [the mask is adapted to reduce deposition of process residue on the radiation transmitting portion and whereby] radiation may be transmitted through the aperture of the mask and the radiation transmitting portion.

16. (amended) A substrate processing chamber according to claim [15] 12 wherein the means for reducing deposition of process residue on the radiation transmitting portion comprises an overlying mask [comprises] comprising an aperture having an aspect ratio of from about 0.25:1 to about 3:1.

19. (twice amended) A substrate processing chamber comprising:

(a) a support;

(b) a gas distributor;

(c) a gas energizer;

(d) a radiation transmitting portion comprising a mask with a plurality of apertures, the apertures having an aspect ratio that is selected to reduce

deposition of process residues on the radiation transmitting portion; and

(e) an exhaust;

whereby a substrate held on the support may be processed by process gas distributed by the gas distributor, energized by the gas energizer, and exhausted by the exhaust, and whereby radiation may be transmitted through the apertures and the radiation transmitting portion.

26. (amended) A window capable of being mounted on a process chamber, the window comprising:

a radiation transmitting portion; and

an overlying mask [with an aperture] comprising a plurality of apertures having an aspect ratio that is selected to reduce deposition of process residues on the radiation transmitting portion,

whereby [the mask is adapted to reduce deposition of process residue on the window and whereby] radiation may be transmitted through the window when a substrate is processed in the process chamber.

27. (twice amended) A window according to claim 26 wherein the [aperture has] apertures have an aspect ratio that is sufficiently large to reduce access of process gas to the radiation transmitting portion.

28. (twice amended) A window according to claim 26 wherein the mask [aperture has] apertures have an aspect ratio of from about 1:1 to about 12:1.

29. (twice amended) A window according to claim 26 wherein the [aperture has] apertures have an aspect ratio that is sufficiently small to allow ions of an energized process gas to enter the [aperture] apertures and etch away the process residues formed on a sidewall of the [aperture] apertures and on the window.

30. (twice amended) A window according to claim 26 wherein the [aperture has] apertures have an aspect ratio of from about 0.25:1 to about 3:1.

31. (twice amended) A window according to claim 26 wherein the [aperture has] apertures have a diameter or width of from about 0.1 to about 50 mm, and a height of about 0.5 to about 500 mm.